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ABSTRACT

Selected aspects of early phonological development are described, and eight important characteristics are suggested. It is held that the child plays a highly active, creative role in the acquisition process. The child's early vocables constitute a connecting link between babbling and adult-modeled speech; the child's phonological systems for perception and production are relatively independent. In the child's construction of a phonological system for production, he begins with structural constraints in selecting adult model words and in producing his own words. The baby talk lexicon of the child's speech community provides a reservoir of phonologically simplified models on which the child can draw for his early words. The child invents and applies to his repertoire of phonetic word shapes a succession of phonological rules which regularize the pronunciation of phonetically similar words. The child gradually relaxes his constraints of selection and production to allow greater standard complexity and phonetic diversity within words. Each child follows his own distinctive route in phonological development. (Author/SW)

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# LEARNING TO PRONOUNCE:

# THE EARLIEST STAGES OF PHONOLOGICAL DEVELOPMENT IN THE CHILD*

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The human child learns the language or languages of the speech community in which it grows up. This is the explicandum, the fact to be explained, as many linguistic and psycholinguistic investigators of child language see it. How does the child manage to acquire mastery of the incredibly complex phenomena of natural human language? Whether or not this feat is, as Jespersen once claimed, the greatest intellectual achievement of every individual's life (Jespersen 1922), it is certainly impressive, and no current linguistic theory is capable of adequately specifying the nature of language just as no psychological theory is capable of adequately accounting for the processes of acquisition. During the decade 1960-1970 most of the psycholinguistic research on language development focussed on the development of syntax and to a lesser extent phonology, often in relation to explicit theories of grammar and notions of innate language universals. The empirical results led investigators increasingly to question the centrality of syntax in development, the correctness of the grammatical theories, and the specifically linguistic nature of the child's innate capabilities for language acquisition. The key words in psycholinguistic study of child language now are semantics, pragmatics, speech acts, communicative competence, cognition, and interaction, and the new approaches are proving fruitful, since children, after all, are essentially 'learning to mean' as Halliday (1975) puts it, rather than acquiring syntax and phonology. What is sometimes overlooked, however, in the euphoria of the greater success in our research, is that the acquisition of syntax and phonology have become even more mysterious. If the child could learn to 'mean' without all the intricacies of adult syntax and phonology, why (and how) does he acquire them, and how does it happen that natural languages exhibit substantive universals of syntax and phonology (cf. Greenberg 1963)? I am happy to leave the question of syntax to others, but in this paper we will explore at least the early stages in the acquisition of phonology, in the hope that such tentative conclusions as we may reach will be of help both for the specification of phonological systems and the understanding of processes of language development (i.e. for linguistic and psycholinguistic theory). Possibly also our explorations may be suggestive for the question of assessment which is the ultimate concern of the conference.

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First let it be made clear that no explicit theory of phonological development is being endorsed or proposed. In another paper (Ferguson & Garnica 1975) current theories were examined and found wanting, and the recommendation was made that researchers should work on concrete hypotheses and narrowly focussed empirical studies for a while before attempting to construct comprehensive theories. If the present paper is going against the letter of that recommendation with the generality of its approach, it is following the spirit of the recommendation by offering only a description, an 'account', of early phonological development as a stimulus to further empirical studies and eventually to more ambitious theorizing.

Phonological development has been surveyed from a linguistic point of view on a number of occasions, and it will help to explain the orientation and biases of the present paper if it is noted that I find Leopold's second volume still the most comprehensive study of phonological development (Leopold 1947), Menyuk's phonology chapter the most convenient review of research since Leopold (Menyuk 1971 Chapter 3), and Ingram's summary of normal acquisition the most congenial recent statement (Ingram 1976 Chapter 2); Ferguson & Farwell 1975 comes nearest to my present views on early stages of acquisition. Macken 1974 is a good selective list of readings, and the references in Ferguson & Garnica 1975 constitute a basic bibliography in the field up to 1974.

## Getting the Idea

During the first eighteen months to two years of his life the normal child lays the foundation for the amazingly rapid and sure development toward mastery of his mother tongue which takes place during the next several years and continues at a less dramatic pace throughout the rest of his life. The foundations laid during the first period are so basic and universal that it is hard to see in them anything of the linguistic structure which characterizes the particular language of the community in which the child is growing up. Yet, this early period is correspondingly important in that it exemplifies universal human capabilities as well as the range of possible individual variation, both to a considerable extent independently of the particular phonological and grammatical structure of the input language. Unfortunately this early language development is even more difficult to study and analyze than the following stage, which itself offers the practicing linguist or psycholinguist problems enough. The account given here is of necessity based on scattered sources of varying merits and not on a broad base of established research findings.

One problem in the study of early phonological development is the special difficulty of investigating the perception side, as opposed to the production side, which is so much more accessible. Many linguist observers of child language tend to ignore the early development of perception altogether. Jakobson 1941/1968, the important linguistic work on phonological development which has stimulated and inspired so many subsequent studies, hardly discusses perception at all, except in a single important paragraph (22-23). Halliday, in a highly original and noteworthy recent linguistic treatment of language development, writes of this early period:

"the language that is learned at this stage owes nothing at all to the adult language that the child hears around him, [although] the child may [his italics] use limitations of the adult phonology as part of the resources for expressing meaning" (Halliday 1975, 9). Halliday has in mind the vocables of his own son at this stage, which in general have no adult models, and ignores the fact that a child in this period 'understands' (i.e. responds consistently to) many words of the adult language and distinguishes between phonetically similar adult expressions. Here in the attempt to follow both perception and production and the relations between them, we must depend largely on earlier accounts such as Lewis 1936/1963 for our longitudinal material on perception. In order to follow the development with one child and avoid the complications of different languages and unrelated examples, the illustrative examples will be cited to the extent feasible, from Lindner 1898, one of the most informative of the older diary studies; it follows the boy Hans from birth to age 4 as he acquires German as his mother tongue.

During the early period of the child's language development, his linguistic perception, as inferred from naturalistic observation, develops from the ability to distinguist between speech and non-speech to a capability of perceiving quite subtle differences in the prosodic and segmental phonetics of the language around him. The child's auditory discrimination abilities are already impressive shortly after birth (for a review of the growing literature on neonate speech-sound discrimination cf. Eimas 1974, Morse 1974 and Morse 1976),but the child must learn to perceive linguistically i.e. to use sound differences consistently to identify and store words so that they can be recognized later and eventually be called up for production.

The first steps in this development are the perception of speech vs non-speech and the identification of 'tones of voice', non-segmental complexes which identify calling to the child, soothing him, singing or the like. Hans Lindner from the 9th day responded in special ways to speech addressed to him. Thus he stopped crying when spoken to although not just at the coming of a caretaker; he opened his eyes when spoken to although he kept them closed when his father clapped his hands in his presence. He reacted to a call by directing his eyes to the speaker, but it was the 'tone of voice' not his name: even several months later he still reacted identically to his own name and to his sister's name (Olga) when said in the same calling tone.

The next step is the recognition of a particular phonetic shape and the appropriate occasion for its use, i.e. the connection between sound and meaning which is the basis of the lexical aspect of language. Hans' first clear instance of this was Ticktack in reference to a loudly ticking wall clock which his parents lifted him up to hear every day as they carefully enunciated the German equivalent of tick-tock. In the 20th week he first responded to the stimulus Ticktack by turning his eyes toward the clock when he was lying in his crib; in four weeks' time he was regularly responding correctly in this way to Ticktack. Many (most? all?) speech communities have little game routines for infants which consist of a

verbal cue expression and a simple hand or hand and head action, such as our patty-cake, bye-bye, peek-a-boo, and the next step after recognizing items like Ticktack is learning to respond to one or more of these game cues with the appropriate motions. A week after Hans was regularly reacting to Ticktack by directing his gaze to the clock he had learned to do the motion for Händchengeben 'give handie'. At first the identification of the phonetic shape in these early recognized signs is in terms of such gross features as length, number of syllables, intonation, and place of accent, but it develops toward greater use of the finer segmental features (Fradkina 1955; Lewis 1936, 114-116). Lewis cites a nice example of the transition from Schäfer 1933: at 0;9,7 his son responded to mache bitte bitte 'make please-please' (i.e. clap your hands to get something) when said with exaggerated baby-talk intonation, at 0;10,0 he responded to bitte bitte said in ordinary tone of voice, and at 0;10,9 clapped at the nonsense stimulus kippe kippe in baby-talk intonation but not at lala lala in the same rhythm and intonation, giving evidence of his recognition of the phonetic similarity of bitte and kippe as opposed to lala.

The whole question of how fine the linguistic perception is at this stage remains open. At least it is clear that the child can notice a familiar phonetic shape embedded in a larger utterance and respond to it. Hans Lindner in his 11th month responded with patty-cake motions not only to backe Kuchen 'bake cake' but to backe doch einmal Kuchen 'bake then once cake (=come on do patty-cake)' in which the two elements were separated and to either backe or Kuchen alone. This ability varies greatly in older second language learners and there may be important individual differences here which are related to success in language acquisition. Hans in an incident about 5 months later gave striking evidence of this ability to attend to a familiar item in the midst of unintelligible material. He was familiar with the word Butter 'butter' and was accustomed to bringing the butter to his mother when she sliced bread. One day his father was peeling a pear for him and said Das ist eine Napoleonsbutterbirne 'That's a Napoleon butter pear' (name of a variety of pear) and Hans ran off to get the butter. It is also clear that even at this early stage the child can distinguish two meaningful parts of an utterance. Thus Hans could respond appropriately to Wo ist die Mieze? 'Where's the kitty?' and Wie macht es die Mieze? 'How does the kitty go?' The former is one of a set of 'where is?' questions (e.g. Wo ist die Ticktack?) to which he responded by looking at the right place. The other is one of a set of 'how does X go?' questions (e.g. Wie macht es die Fabrik? 'How does the factory go?' referring to its noontime whistle) to which he responded by making an appropriate noise. Even if some of the burden of the distinction was on the tone of voice or paralinguistic aspects of the utterance, clearly two meaningful elements are recognized.

Very few studies throw much light on this question of the degree of phonetic difference which children utilize linguistically at this period. Shvachkin and others who use his minimal-pair nonsense-word research technique (Shvachkin 1948, Garnica 1973, Edwards 1974, Barton 1976) hardly reach down to this age, and the research method itself has many problems.

Once again we are dependent on anecdotal evidence. Hans offers one interesting case of phonetic confusion, but the phonetic similarity is accompanied by strong semantic similarity and the case may not do justice to the question. In the 49th week Hans was asked at the table to bete auch mit 'pray also with' i.e. to (fold his hands and) join the others in table-prayer, but to his father's surprise he clapped his hands as though he had been asked to make bitte-bitte. The confusion is evident, but the phonetic similarity of bete : bitte, the similarity of the hand motions, and the fact that bitte-bitte is usually done before getting a piece of cake or other food and the table-prayer is said just before getting food may all be factors in the confusion. One useful way of getting evidence on this question would be to encourage phonetically sophisticated parents and caretakers to try to evoke revealing incidents based on their knowledge of the linguistic repertories of particular children. (Two of the best accounts, by Deville and Lewis himself, are reported in Lewis 1936, 106-109, 300-301; Vihman 1976 also gives valuable examples).

As mentioned above it is not easy to determine the young child's linguistic repertoire in the sense of those sound-meaning correspondences of the input language which he has identified and stored and can utilize for recognition. The parent's fond belief that 'he understands every word we say to him' and the speech scientist's scepticism about the child's linguistic perception in the absence of evidence from production are equally unhelpful. Some rough idea of the extent of such repertoires may come from several of the diary studies which have paid attention to this question, but the information is much more fragmentary than the production data they provide. At Hans' 30th week his father reports that he definitely recognized Tick-tack, his own name as distinct from the names of others around him, the names of his doll and the cat, and the word gingein 'glug-glug (=drink)'. The last item is an example of the well-known phenomenon of a word created by the family on the basis of a sound made by the child, in this case in connection with drinking; the 'word' was then learned and recognized by Hans from the family's use of it. Probably this list is incomplete, since at least Händchengeben (gib Händchen!) is also attested. A few weeks later his father reports that Hans definitely recognized the word for teeth (he had just had a painful two weeks of teething problems), but kept learning for the moment and forgetting a number of other body parts (nose, eye, ear, mouth). At the beginning of the 15th month when the father recorded a current inventory of recognized commands, the list was: go, come, stand up, listen, smell, give, speak, say, and the questions where is?, how does X go?, and how does it taste? (wie schmeckt's? answered by a special click sound); at that time he doubtless also had names of objects and people, game-cues, and other items in his recognition vocabulary. This was at a time when Hans' total active lexicon consisted of only a handful of items (mamam, m̄, ā, da, see below). At the beginning of the 18th month when the father attempted another inventory he reported that Hans knew the names of most of the objects in his room and the kitchen, i.e. could either point to them or bring them on request. He also recognized these verbs: come, go, be (in a place), fetch, bring, catch, eat, drink, sleep, close eyes, lift up, hold. wash, go in the water (eintauchen), dry off, put (legen), stand up, give, take, laugh, cry, hear, listen, want, "and many others". He knew hot, wet, dirty, tired, away (=absent); who, what. where,

where to (wohin), how. This inventory is undoubtedly only partial, but gives some notion of Hans' ability to make linguistic use of phonetic differences in perception and memory. At that time he had an active vocabulary of about a dozen items, discussed below.

Before moving to a discussion of the phonological development of production in the young child the important question of intonation should be mentioned. It is widely accepted that the development of the infant's use of intonation starts earlier and proceeds more rapidly than the development of his 'segmental' phonology, but I know of no studies which seriously pursue this question on the perception side. Existing studies either tap the child's auditory discrimination ability (e.g. Kaplan 1969) or his phonetic differences in production (e.g. Tonkova-Yampol'skaya 1968/1973, Menyuk & Bernholtz 1969). Crystal's thorough review of the literature on intonation and related phenomena in first language acquisition offers very little on early perception (Crystal 1975, 125-138); perhaps his paper at this conference will help. This whole prosodic issue--both perception and production --is likely to be crucial in our understanding of language development, and now that the lack of a suitable descriptive and analytic framework is being remedied (cf. e.g. Crystal 1969 and Lehiste 1970), perhaps the problem of adequate research techniques can be solved.

During the early period the child's linguistic production, as described by a variety of observational, analytical, and experimental techniques, develops from the early 'cooing' or 'comfort sounds' (Lewis 1936, 30-33) through an extensive period of babbling to the active control of a small set of meaningful vocables with incipient phonological organization. If we disregard the crying and 'fussing' vocalizations because their relevance to phonological development is questionable and at best indirect, the first vocalizations on the way to phonologically organized speech are presumably the back sounds (e.g. velar fricatives and continuants, central and back vowels) called 'cooing' which typically appear in the second month. In many speech communities this kind of vocalization is conventionalized as the baby's 'first word' or 'first sound'. Thus in a large part of the Arabic-speaking world the baby's first sound is expected to be [nkɨɣ] and the Arab mother often playfully says this 'word' to her child and 'recognizes' it when the child says something like it (Ferguson 1956). In the English-speaking world there is some tendency to expect goo or coo as an early sound (cf. the term 'cooing'), and among German speakers there is a fairly widespread expectation that the first baby sound will be ʁrrʁ or arra. Accordingly it is not surprising that Lindner recorded the first cooing of Hans on his 59th day as ʁrrʁ or arra (the Sterns report erre for their children, Preyer ʁrro, arra for his son). All these conventionalized 'first sounds' contain velar or post-velar voiced consonants and non-high-front vowels; they provide a convenient normalization of the infant's varied productions and may even serve as an imitation facilitator in the early months' vocalizations.

Two explanations have been given for the early predominance of back sounds. The older, traditional view is that the pleasurable vocalizations usually occur after feeding when the infant is lying on his back, and are produced by swallowing and air-expelling movements associated with feeding, involving the back of the tongue and velum, which are also favored by the

reclining position (Lewis 1936, 30-32). The newer view is that the progression of myelination in the primary motor cortex proceeds from back of the mouth to front in the 'homunculus' and as a consequence the child's neuromuscular control of the vocal tract progresses from the back parts of the mouth to the front (Whitaker 1973, Salus & Salus 1974). Other specialists at this conference are better qualified than I to evaluate these two explanations, and I simply record the fact of early cooing.

The next step is babbling. The cooing sounds diversify, and a wide range of sounds are produced, often apparently as a kind of oral play. The baby may produce clicks, grunts, and sounds hard to identify phonetically as well as more vowel-like and consonant-like sounds alone and in sequences. The sounds of the child's babbling often differ strikingly from the speech sounds of the surrounding language, for at least three reasons: (1) the child's vocal tract differs considerably in size and configuration from the adult's, (2) the child has not yet acquired the basic motor control of articulation (breathiness, voicing, fundamental frequency, timing, nasality, etc.), and (3) the child has not yet acquired the phonological patterns of the language. During the typical 6-8 months of the babbling period the child makes great progress on (2), and indeed this may be regarded as one of the accomplishments of the child's babbling 'practice': by the end of the period, for example, spectrograms of the child's vowel sounds are beginning to look like recognizable vowels. The role of babbling in phonological development is often seen in either of two extreme views, (a) the continuity view, which holds that the varied sounds of babbling are gradually shaped toward the sounds of the input language by selective reinforcement on the part of the parents and other speakers in the environment, and (b) the discontinuity view, which holds that babbling is of little or no significance for phonological development and there is a sharp break between the random vocalizations of babbling and the more limited but highly structured productions of 'true speech'. Neither of these positions is tenable. On the one hand the child may make sounds frequently and easily in his babbling which he is unable to make later in speech and must acquire slowly and with effort, and there is no convincing evidence of the kind of selective reinforcement for adult sounds which would be required. On the other hand, the child's babbling develops in the direction of adult speech at least in terms of syllable structure and intonation, and there are often similarities between the syllable repetitions of late babbling and the reduplicated early words of the child. See Ferguson & Garnica 1975; Oller et al. 1976.

The development of Hans' babbling is a typical example of the progress in production during this period. In the third month Hans' father noted that his babbling monologs became more frequent and the sounds in them more varied. Some sounds were produced 'accidentally' and occurred only once (e.g. bewe) while others were frequently used favorites (e.g. nging, Hrre); some were impossible for the father to identify or pronounce (e.g. hrngl). His progression in the use of babbling responses to speech addressed to him was typical: in the 30th week he would respond by repeating his babble sound when his mother or sister imitated it after him, in the 33rd week he would regularly respond with his own babbling when someone spoke to him, and in the 40th week he could imitate an adult a addressed to him. By the first month of his second year he was babbling strings of clear CV syllables

with occasional V or CVC syllables (mammam, papap, dadada, nanana, anna, dedededei), the C's in all cases being labial or apical stops or nasals.

The study of child language development usually moves from a consideration of babbling to a consideration of the 'first word' or the earliest words in the child's active lexicon and the holophrastic period of one-word sentences. To make that jump, however, is to miss one of the most revealing periods in the development. At some point in the babbling period, the child typically begins to make active use of sound-meaning correspondences of his own, i.e. he produces a set of vocables which function communicatively much like the later 'first words' but are not based on words of the adult language. Although some investigators have commented on how difficult it is to recognize the true 'first word', the significance of these linguistic creations of the child is generally missed. The active lexicon of the child at around the end of the first year, say between 10 months and 1 year 2 months depending on the child, typically consists of a dozen or so vocables of which only one or two are pretty clearly based on adult words; most of the rest are apparently based on a non-speech noise in the environment or a babbling sound originally uttered by the child in a certain context and used by him when the context recurs or he wants to allude to it. Halliday's son at about the 10th month is reported to have had 11 or 12 expressions in more or less consistent use, and only one of them [bø] meaning roughly 'give me my bird' had an obvious source in the adult language. See Dore et al. 1976 (pp. 15-21) for a discussion of such vocables, which they call PCF's (phonetically consistent forms).

Hans Lindner at the 42nd week began saying a loud clear [ha] after he finished each mouthful of solid food; a few weeks later he was making various noises in response to How does the X go? and a click for How does it taste? In the first month of the second year, he had the clearest example of a vocable without adult model: a long m̄ which meant in effect something like "Here comes a wagon" or "I hear a wagon coming'. At this same time Hans used a series of short m̄'s when pretending to read aloud from the newspaper his father had just put down, and also would say mamam (one of his babbling sequences) when someone said to him either mama or papa. This last is of special interest since Hans definitely recognized the difference between mama and papa as referring to his mother and father, but did not use them himself to call his parents and had only the one form for both in his response to the adult elicitations. A month later mamam became mama and was used on his own initiative.

The early non-adult modeled vocables of the child tend to be of four phonetic types in addition to clicks or other 'non-speech' sounds: (a) single or repeated vowel, (b) syllabic nasal, (c) syllabic fricative, and (d) single or repeated CV syllable, in which the C is a stop or nasal. Examples of these may be found in the detailed lists of Lewis (Appendix IV 2, "eaningful utterance by K in his 11th, 14th, and 17th months, Lewis 1936, 302-303) and Halliday (Figures 1-3, covering Nigel's language from 0;9 to 1:1½, Halliday 1975, 148-150). Many other examples are scattered through the literature, e.g. Roberto's m̄ (von Raffler-Engel 1964), Hildegard's palatal click and ʃ (Leopold 1947). Jakobson in his Kindersprache regarded such examples as marginal, noting that marginal sounds may play a larger role in child phonology than adult phonology and may sometimes be the starting point for sounds of true speech (Jakobson 1968).

The normal emergence of a small active lexicon of sound-meaning correspondences largely without adult models at a time when the child has a much larger passive lexicon of sound-meaning correspondences almost entirely with adult models suggests three important characteristics of early phonological development:

(1) The child plays a highly active, creative role in the acquisition process. He 'gets the idea' of having particular sound sequences 'mean', i.e. that they should have appropriate occasions of use. He creates his own sound sequences from surrounding sounds (e.g. animal cries, sounds of wagons) or sources other than adult models. It cannot be assumed this is always because the adult expression is too hard to remember or produce or because no adult model has come to his attention.

(2) The child's early vocables constitute a connecting link between babbling and adult-modeled speech. The early vocables are more limited and more structured than babbling and they only partly fit the constraints of the child's emergent phonological system. They are not babbling sounds being shaped toward adult sounds, but babbling-like sounds used meaningfully. Their use begins during the babbling period and continues into the stage of predominantly adult-modeled lexicon.

(3) At least in the early stages, the child's phonological systems for perception and production are relatively independent. At least as early as the 6th month the child gives evidence of a phonological system for perception since he distinguishes different words of the input language. Although it is not clear the extent to which the differentiation may be whole word-shapes, intonation contours, word prosodies, syllables, or phoneme-length segments, it must be directly related to the phonetic characteristics of the adult words. The child's first meaningful vocables, however, typically consist of repeated vowels, syllabic consonants, and other sounds which are marginal or non-existent in the adult phonology and do not reflect systematic substitution processes in relation to the adult words. For a discussion of the plausibility of two phonological systems connected by a network of transduction relations which becomes denser as the child's language develops, see Ferguson, Peizer & Weeks 1973. A somewhat similar view is proposed for syntax in Bever 1975, although with a different rationale.

## BABY TALK WORDS

Beginning late in the 19th century and reaching a peak of activity in the 1920's and 30's, students of child language development devoted critical attention to the characteristics of the child's 'first words'. This material is summarized in Bateman 1917, Lewis 1936, McCarthy 1954 and a number of other places. The literature tends to disregard the early vocables not based on adult models, but it is valuable for the study of phonological development because these early words are the beginnings of control, on the production side, of the phonology the child is acquiring. It was to a considerable extent this literature that Jakobson utilized for examples in his Kindersprache.

Since different observers have used different criteria for identifying the 'first word' and generally each case is decided by a single observer,

and since observers also differ greatly in the exactness of their phonetic descriptions, it is unwise to calculate precise statistics on the date of appearance and phonetic characteristics of the first words. It is probably safe to estimate, however, that the majority of children produce their first adult-modeled words between the 10th and 13th months and that the majority of the first words are CV or reduplicated CVCV in which the consonants are labial or apical stops or nasals. Lewis, in his summary of the first words of 26 children as reported by various observers (using a maximum of six different words per child), figures that 75% of the words contain front consonants and 85% are either monosyllables or reduplicated.

Jakobson's impressive theory of phonological development claims that "the relative chronological order of phonological acquisitions remains everywhere and at all times the same" (Jakobson 1968, 46). He specifies the very first word as "ordinarily" having the phonological structure /pa/, i.e. some kind of labial stop followed by some kind of low vowel. This structure is followed in succession by the opposition between oral and nasal stop and the opposition between labial and apical stop: (1) pa; (2) mama : papa; (3) papa : tata, mama : nana. This consonantal differentiation is then followed by the opposition between lower and higher vowel a : i. Jakobson's predictions of these early stages in phonological development are useful as a kind of idealized progression justified by underlying linguistic or psycholinguistic principles, but they are not borne out in the numerous diary studies available. At the present time it is not even possible to give a statistical validation of his predicted order as the most frequent, partly because of the incomparability of the published studies. Certainly many children do not follow Jakobson's 'universal order' at this early stage, if the observers' accounts are to be trusted. Even Velten 1943, one of the classic descriptions in terms of the Jakobson paradigm, requires an alternative possible order at this earliest stage to allow for his subject's acquisition of a stop-spirant opposition before stop-nasal.

Jakobson's contributions to the understanding of phonological development at the earliest stages are his insistence on the different phonological status of babbling and meaningful speech, on the orderliness of phonological development, and on the relationship between patterns of acquisition and the essential characteristics of the sound systems of human languages (cf. Ferguson 1975b).

The Moskowitz view of early phonological development, which is a revision of the Jakobson theory, incorporates the reduplication phenomena in the universal order of acquisition (Moskowitz 1973). She claims that the child's first phonological units of opposition are syllables, not phoneme-type segments as Jakobson suggests. The child first has CV and reduplicated CVCV words, then can produce CVCV words with only consonant harmony or only vowel harmony $C_iVC_iV$ or $CV_iCV_i$, and only arrives at phonemic segmentation when he can produce CVCV words without harmony of either kind. This predicted order of acquisition accounts for some behavior which Jakobson's theory does not explicitly predict, but it is also an idealized progression justified by underlying principles which is not borne out in the diary studies. Even Burling 1959, which Moskowitz cites as evidence for her theory, also includes data which do not fit.

The Moskowitz contributions are her insistence on the active role of the child in discovering contrastive units and on the gradual progression from larger word and syllable units to smaller cluster and phoneme units.

At the stage of the first words, the normal patterns of development can be summarized in terms of semantic and phonological probabilities as follows. Over a period of several months the child acquires a small active lexicon of adult-modeled words appropriate to situations in the semantic fields of food, caretakers, sleep, deixis, animals, moving/noise-producing objects, toilet functions, pleasure, absence/departure. These words are most commonly CV or CVCV, less commonly VCV, CVC, CVCVC; they most commonly exhibit full reduplication or syllable harmony (same consonants) or vowel harmony (same vowels). A word may fluctuate considerably in pronunciation, most often in the following ways: final consonant present or absent, monosyllable or reduplication; stop or spirant consonant articulation, voiced or voiceless, low central or mid-front vowel.

The semantic/pragmatic side I leave to others such as Halliday, who describes his own son's development in English (Halliday 1975), or Bates (1974), who follows the "gradual passage from vocalization, to vocalization-as-signal, to word-as-signal, to word as proposition with referential value" (73) in two Italian children. The phonological side calls for discussion of the structural limitations and the variability of pronunciation.

The structural limitations are striking. Presumably the child has in his long-term memory scores of adult expressions sufficiently identified phonetically for him to be able to recognize them when he hears them again. Presumably also he has the ability to make a wide range of sound sequences in his babbling. Yet his first adult-modeled vocables are severely constrained in phonetic shape. We may acknowledge that the stored representations are probably fuzzy and indeterminate in part and sometimes even wrong, misheard or misremembered. We must also acknowledge that there are structural constraints on babbling, e.g. consonant clusters and fricatives are rare as are polysyllabic sequences with varied consonants. Even so, the production constraints suggest that the child in building up a stock of lexical representations for production is proceeding to develop step by step a phonological system structurally independent of the other two.

As the child begins to realize, as it were, the enormousness of the task of constructing in his own production capacity the words of the adult vocabulary, he selects a few word types as a basis and avoids attempting other kinds of words, even if they are familiar items in his recognition store. The fact of selection and avoidance, although sometimes noted earlier (e.g. Engle 1965) was largely ignored until fairly recently, but a succession of studies in the 1970's have documented it and underlined its importance (Ferguson et al. 1973, Ferguson and Farwell 1975, Kiparsky and Menn 1975, Macken 1976, Vihman 1976). The selection is in terms of two parameters: (a) size and complexity of structure, and (b) segmental sound types. On the first parameter, for example, one child may choose to attempt only models of the shape

CVCV ending in -ie/-y such as doggie, mommy, patty(-cake), daddy (Leslie, reported in Ferguson et al. 1973); another child may choose only CV(C) words such as see, that/there, juice, no, hi (Jonathan, reported in Braine 1971). Many children probably select CVCV models in which the consonants are either identical or at least agree in place or in manner of articulation (e.g. J. reported in Macken 1976). On the parameter of sound types, for example, children may choose only words beginning with labial or apical stops or nasals, i.e. avoid words beginning with fricatives or velars (Leopold 1947). A particular child, however, may choose to avoid adult words with nasals (Vihman 1976) or even to prefer words with velars (Menn 1971) or with fricatives (T, Ferguson & Farwell 1975). The phenomenon of selection and avoidance continues past the period of the very first words, and it will be discussed in 3. below along with its gradual relaxation; here the important point is the evidence it gives for the construction of the child's own production phonology.

The word selection patterns are only part of the process; the other part is the construction of word production patterns, and these may well be logically prior in the sense that the selection patterns may be based on them. A child may, for example, set up as his 'canonical shape' a full reduplicated CVCV: Leslie at 0;11 (Ferguson et al. 1973) generalized one of the consonants in the model and the first vowel doggie → [gaga], patty (-cake) → [bæbæ]. Another child may set up a CV monosyllable of one sort or another: Jonathan (Braine 1971) had dV as his pattern, substituting d for the initial consonant of the model, copying the vowel approximately, and dropping the final consonant see → [di:], no → [do]. Many children have both CV and CVCV as production patterns, with internal constraints on phonetic qualities. The use of CVC is probably more common as an early pattern among children whose input language has such syllables (e.g. German as opposed to Spanish learners.) It is important to note that the production patterns appear also in words without adult models, as in Leslie's [gægæ].

Hans Lindner's active lexicon in the 17th month had six adult-modeled words, in chronological order of observed use.

| | model | gloss | child's word | gloss |
|---|---|---|---|---|
| 1:2 | das | 'that' | da~de~ded~dada~dat | 'look at that, I want that' |
| | Mama<br>Papa | 'mommy'<br>'daddy' | mama | 'mommy, daddy' |
| 1;3 | ah | 'ah' | ā | 'oh, mommy's all gone' |
| 1;4 | Birne | 'pear' | bap | 'pear, fruit, something good to eat' |
| | Gasse | 'street' | gack=[gak] | 'going out of the house' |
| 1;5 | Wewe | 'weewee' | wēwē | 'I've wet my diaper' |
| | Papa | 'daddy' | papa | 'daddy' |

Table 1. Hans Lindner's earliest words (data from Lindner 1898).

Hans' selection patterns are (C)V(C), reduplicated CVCV and CVC(C)ə; his production patterns are (C)V, reduplicated CVCV, and CVC. His first word, whose CVC model ends in s, fluctuates among all three production patterns, finally settling on da~dat. The reduplication models are copied, and the other disyllables are produced as CVC in which the consonantal onset and coda are the same stop, voiced and voiceless respectively. All three of these production patterns are frequent in children's early words.

The construction of favorite production patterns and the child's insistence on fitting his selected models into them continue past this earliest period and will be discussed, along with the increasing diversification of the patterns, see below. For the moment it suffices to note the separateness of the perception and production systems. The mama:papa mismatch of Hans is a good example and it is not an isolated, idiosyncratic instance. This pair of words, found in so many of the world's languages (Jacobson 1960), are frequently combined in production even though they are distinct in perception and initial m- and b-/p- occur in other patterns and in babbling.

The words in the child's active lexicon vary in pronunciation. Some may be relatively constant while others show extensive fluctuation, but the general fact of variation is important. See Ferguson & Farwell 1975, for discussion and examples. Some variant pronunciations are 'natural' in that they reflect the same kind of processes found in historical sound change and in the language interference of borrowing and second language learning, e.g. the dropping of final consonants and the substitution of stops for spirants as in dat~da from model das. Other variation is less typical of sound change in general and is more clearly related to the child's perception and production skills and strategies. The two best documented types are reduplication of a monosyllable (e.g. das → da~dada) and segmental 'migration' as when a final nasal in the model appears as an initial nasal in the child's pronunciation. Jakobson 1971, (25-26) explains reduplication as a means of marking structured true speech as opposed to babbling; Moskowitz 1973 explains it as a framework within which segmental differentiation can take place. Waterson (1971 and elsewhere) explains the 'migration' by the hypothesis of prosodic as opposed to segmental perception and production. Both phenomena need further study.

A final feature of the pronunciation of the earliest words must be noted: particular words or parts of words may not conform wholly to the child's characteristic production patterns. Thus one word may be pronounced with an exactness quite out of line with the general level of phonological development (e.g. the classic example of Hildegard's pretty) or may be quite aberrant, as in Hans' jjj 'sugar' (18th month, model Zucker?). This phenomenon is familiar to the foreign language teacher who has observed learners pronouncing particular words strikingly better than their general level of pronunciation or quite outside the system of the languages. In children's development such 'phonological idioms' sometimes seem to regress in that they may be temporarily brought into line with the child's current phonological system before finally returning to the more accurate pronunciation. For discussion of this phenomenon from different points of view cf. Moskowitz 1973, Ferguson & Farwell 1975, Kiparsky & Menn 1975; it is discussed again below.

The child's earliest active lexicon, as characterized above by semantic fields and phonological constraints, has a counterpart in adult speech addressed to young children. Every speech community has special ways of talking to young children, including such modifications as higher pitch, shorter and simpler sentences, repetitions, hypocoristics, and attentionals (Ferguson 1964; Snow and Ferguson, forthcoming), and 'baby talk' (BT) of this kind includes a special lexicon of words regarded by the community as primarily appropriate for use to and by children. The semantic fields and phonological structure of these BT words tend to match those of the children's first words. Most BT words are conventionalized, i.e. are part of the total word stock of the community, transmitted by historical processes and diffusing from one speech community to another (e.g. BT pap(p)a 'food' is attested in languages around the Mediterranean for 2000 years). For discussion and examples cf. Ferguson 1964. Apart from any functions BT words may have in the cognitive/semantic development of the child or in general socialization processes (Ferguson 1975), they may serve as appropriately simplified phonological models for early child vocabulary, and as such may play a useful (although presumably not a necessary) role in early phonological development.

The phenomena of selection/avoidance, production patterns, variability, and BT counterparts suggest the following additional important characteristics of early phonological development (cf. p. 3 above).

(4) In the child's construction of a phonological system for production, he begins with structural constraints in selecting adult model words and in producing his own words. The constraints are typically in syllable structure and degree of phonetic diversity within the word. Although at this stage the constraints do not operate in phonemic terms (i.e. by contrastive segments composed of distinctive features), they foreshadow the complex regularities and constraints of adult phonological organization.

(5) The baby talk lexicon of the child's speech community provides a reservoir of phonologically simplified models on which the child can draw for his early words. Although the child may select other adult models or fix on word-shapes of other origins, the BT lexicon is a major source of early words.

## BUILDING A PHONOLOGY

The acquisition of the first fifty words was selected, more or less arbitrarily, as a period in which to study phonological development by Pacesova (1968), Ferguson & Farwell (1975), and others. Ingram, however, in recent treatments of child phonology (Ingram 1975, 1976), suggests that this period up to about the fiftieth word constitutes a natural stage in phonological development which is significantly different from what follows. In making this judgment he relates phonological development to Piagetian stages and, like a number of other recent studies of language development (e.g. Nelson 1973, Halliday 1975), finds important linguistic phenomena which coincide roughly with the onset of symbolic representation at the end of Piaget's sensorimotor period of cognitive development. The insistence on differences between earlier and later phonological development is a healthy reaction. Some of the most impressive modern studies of phonological

development (e.g. Moskowitz 1971, Smith 1973) have focussed on the 2- to 4-year-old period when it is possible to make statements about inventories, representations, and rules which are similar in kind to those made for adult phonologies, and the linguists' natural inclination has been to retroject the machinery of phonological analysis as far back as they can. Some linguists, for example, assume that the child's lexical representations (i.e. the form in which words are identified and stored) are essentially identical with the adult's at a very early age and that the improvement in pronunciation is either by gradually learning to produce distinctive features in various combinations and environments (e.g. Smith 1973) or by gradually suppressing, limiting, or reordering innate natural phonological processes (Stampe 1969). These approaches take phonetic segmentation, phonological organization, and linguistic perception for granted and leave little or no room for phonetic word-shapes, constraints on phonetic diversity within words, and individual differences in development, all of which are striking characteristics of phonological development in the early period of 'the first fifty words'. The development will be treated here under the headings Words and Sounds, Permitted Complexity and Individual Strategies.

Words and Sounds

Linguists' attempts to analyze the child's earliest utterances in terms of phonemic segments, oppositions, features, and rules have been useful in providing a framework for statements about phonological development, but recent longitudinal studies have given evidence that these units of analysis cannot have their adult value at this stage and that other units are more basic. In particular, the total word seems to function as a phonetic unit, i.e. the child remembers and recognizes the phonetic shapes of whole words and articulates in terms of phonetic word-shapes. Thus the 'oppositions' in the child's system are at first in terms of words, and only gradually do the partial similarities and differences between words and within words come to be in terms of segmental identities and oppositions.

The evidence for the primacy of the word is of several kinds. First there is the obvious fact that individual words vary greatly in their stability of pronunciation. One word may be pronounced just about the same way for a long time while another word may show great fluctuation in pronunciation, even being pronounced in a number of different ways on the same occasion. Sometimes the more stable words have simpler and easier to pronounce adult models and the more variable words have more difficult models, but this is not always the case and other factors are at work. For example, Hildegard's Carolyn was a stable [dada] for months, while ball fluctuated quite widely. Second, the phonetic ranges of word pronunciations make the establishment of phonemic oppositions very problematic. For example, the girl K during an 8-week period (Ferguson & Farwell 1975) had one word no which was always pronounced with [n-], several words beginning with m or n in the adult models which she pronounced with [m] (sometimes varying with [n-] regardless of the model) and several words beginning with m in the model which were regularly pronounced with [b-] similarly to a number of other words with adult b. During that period K did not have clearcut b m n oppositions; she had word oppositions with only incipient identification of b m and n segments.

Another kind of evidence for the word as phonetic unit is prosodic interchange within the word, as when the child perceives nasality or some other phonetic characteristic in the model and then locates it in the wrong place or spreads it through the word. Ferguson & Farwell (1975) offer an extreme example of this phenomenon, when K is attempting a new word pen and has trouble sorting out the features of nasality, bilabial closure, alveolar closure, and voicelessness. In a single half-hour session K pronounced the word ten different ways including [mã$^{e}$], [dɛ$^{dn}$], [p$^{h}$in], and [buã]. This certainly does not suggest a representation consisting of an ordered sequence of phonemic segments. Waterson (1971 and elsewhere) emphasizes this kind of word prosodic perception and production and the child's construction of perception 'schemas' and production 'patterns' for sets of phonetically similar words.

Perhaps the most striking evidence for the child's early word-shape representations is the existence of the 'phonological idioms' mentioned above, i.e. words which are pronounced better ('progressive idioms') or worse ('regressive idioms') than other words which are more typical of the child's current phonological system. The notion that the child learns words as whole phonetic shapes and constructs his own phonological segments, rules, and systems allows us to see these phonological idioms as natural, not aberrant, phenomena, but any theory of phonological development must account also for the instances when a child changes his pronunciation of a word (e.g. a 'progressive idiom') to a version which seems farther from the adult model.

This phenomenon of going backwards or changing for the worse is the counterpart in phonology to the child's extensions and overgeneralizations in other aspects of language development, first documented for inflectional morphology (Ervin 1964), but now recognized in lexical semantics (Clark 1974) and syntax (Bowerman 1974) as well. For the overgeneralization interpretation in phonology cf. Kiparsky & Menn 1975. When the child's pronunciation of a word apparently regresses to a less accurate one, this often reflects the operation of a newly acquired rule affecting a number of words of similar phonetic shape, and the change represents a step forward in the development.

This kind of apparent regression in phonological development is now well attested for the later stage of rapidly increasing vocabulary and the development of phonological organization. A widely cited example is the succession of pronunciations of the words side and light by Smith's son Amahl (Smith 1973, p.80). After learning to distinguish the two words in pronunciation A. a little later merged them again as part of a lateralization rule applying to /s/ and /ʃ/ under certain conditions, a step toward his mastery of the sibilants. The facts are given in Table 2.

| | side | light |
|---|---|---|
| I | [dait] | [dait] |
| II | [dait] | [lait] |
| III | [lait] | [lait] |

Table 2. Development of s- and l- in A's speech (data from Smith 1973).

The apparent regression is comparable to the appearance of overgeneralized forms such as comed when the child has previously used the correct came; the 'error' reflects the operation of a newly acquired general rule affecting many verbs and it represents an advance over the word-by-word learning of past tense forms. The exceptions and incorrect formulations of the rule must then be corrected by the child.

At the later stage of Smith's child, a phonological overgeneralization often reflects the replacement of one phonological rule by another one which is in some respects better. At the early stage under discussion here, the overgeneralization often represents a very basic step in moving from a whole word shape toward a segmental phonological structure of the word. The most frequently cited example is Hildegard Leopold's 'first permanent word' pretty already mentioned in 2. above. She pronounced it almost perfectly for about a year (1;10-1;9) until she reduced it to [pIti], bringing it into line with the phonological structure of other words. A month later, as she was beginning to master the voicing distinction in production, she overgeneralized her initial voicing rule (cf. Ingram 1974) to this word making it [bIdi], still further from her early phonetically accurate pronunciation. Leopold noted in the first two years nine such words which started just about perfectly and changed in the course of development.

Hans Lindner provides a nice example of an early change in the pronunciation of a word in which part of the change is phonetic improvement by the addition of a previously omitted segment and part is phonetic regression by overgeneralization. In the 22nd month Hans at first said dake 'thank you' for adult danke, but later in the same month changed to ganke. He added the nasal segment and at the same time assimilated the initial dental stop to the following velar in accordance with a velar-dominant consonant harmony rule. This rule affected his versions of adult gut 'good' and Stock 'stick, cane', transcribed by his father as gug and gock, and was consistent with his early $C_iVC_i$ canonical form (e.g. Gasse → gack cf. Table 1).

Thus the phonological development of the child at the early stages proceeds by changes in the pronunciation of individual words. These changes may in some instances result from improved identification of the phonetic shape or phonological structure of the word, i.e. by 'restructuring' its input representation, as when a child discovers that the word begins with s- not f- as he had supposed (Smith 1973, pp. 145-146). In some instances the changes show improved ability to produce particular segments or sequences, as when a child learns to pronounce the sound complex [ŋk] which he had previously not been able to do, e.g. Hans' ganke. The most interesting cases, however, for our understanding of the processes of acquisition are when the child makes a hypothesis about phonology which he applies to words which meet the conditions for its application, as when a child tries out a rule of initial voicing, e.g. Hildegard's [bIdi]. Ferguson & Farwell 1975 treats such a hypothesis or rule application as similar in nature to a sound change in progress: it may spread from one word to another, it may fluctuate in application, it may eliminate an existing contrast. The example cited there of the early

development of Hildegard's /l/ illustrates her word-by-word struggle to acquire [l] as a phonological segment and to apply her rule of replacing liquids by [j]. See Table 3.

| | hello | alle | bottle | lie | Loch | Löscher |
|---|---|---|---|---|---|---|
| 1;5 | ʔəlɔ | | | | | |
| 1;6 | | | ba:ɪ | | | |
| 1;7 | | ʔalə | ba:ɪ | | | |
| 1;8 | | ʔajə | baɪu | | | |
| 1;9 | | | balu | | | |
| 1;10 | jojo | ʔalə | baju | | lok'/jok' | |
| 1;11 | jojo | | balu | jaɪ | | loko/joke |

Table 3. Development of the lateral /l/ in H's speech during the 2nd year.

Changes which represent the relaxing of constraints on complexity, whether as additions to inventory or application of rules, will be discussed in subsequent sections; here we may summarize the main point of this section by listing another important characteristic of early phonological development:

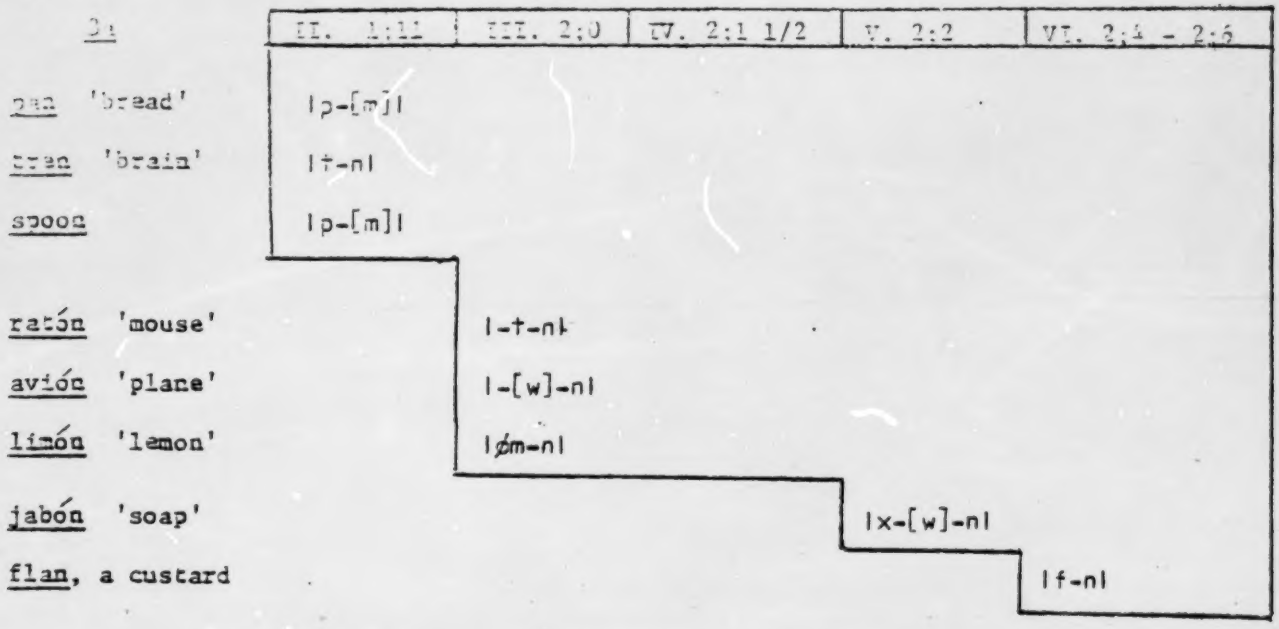
(6) The child invents and applies to his repertoire of phonetic word shapes a succession of phonological rules which regularize the pronunciation of phonetically similar words. The rules may be straightforwardly facilitative of pronunciation or they may be steps in the increasing phonological organization superimposed on the word shapes; in either case they reveal the problem-solving, hypothesis-forming capacity of the child.

Permitted Complexity

The earliest words of the child tend to be severely restricted in their structural complexity (e.g. number and type of syllables) and in the amount of phonetic diversity within them (e.g. phonetic similarity of consonants), and a large part of the development during the '50 word' period is the successive loosening of these restrictions. For example, if a child has the early limitation on production that words of the shape CVC begin and end with the same consonantal articulation except that the onset tends to be voiced while the final is unvoiced, the limitation may first be loosened to allow only one difference (place, manner, or voicing) and then later two differences. In fact, this was the case with Hans. His early CVC words were dat, bap~pap, gak, pip, mem~mom; in the 22nd month he added bet and wap to his active vocabulary, the former illustrating a place difference, the latter a manner difference.

Macken 1976 gives a detailed report on J, a Spanish learning child whose early phonological development gradually relaxed the structural and phonetic similarity restrictions in an extremely orderly way, showing a 'strength hierarchy' of stops, nasals, and fricatives. For example, his rendition of adult tasa 'cup' went successively ta, tata, tasa (with

difficulty), sasa, tasa (transcriptions simplified) over a period of five months. His production of final nasals began in monosyllables with initial stops and was extended gradually to longer words and words with fricatives. Similarly, his production of fricatives began in words that had no other consonants and was extended gradually to words with nasals or fricatives, and finally to words with stops. Table 4. reproduces a summary chart prepared for Macken 1976 but not included in the published version.



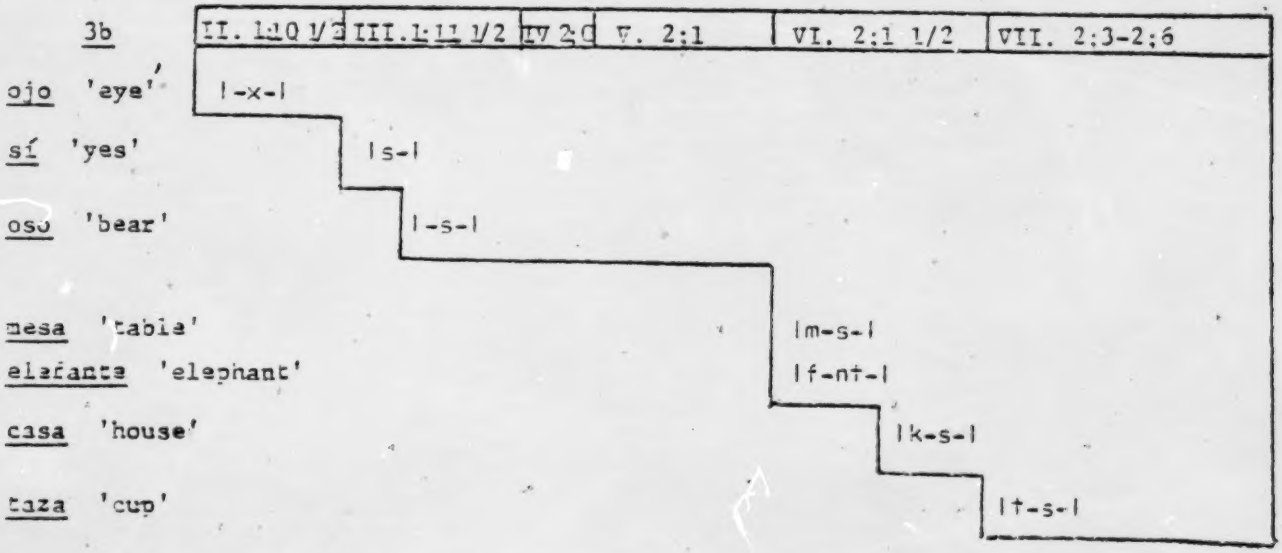




Table 4. Development of 'permitted complexity' by J (Macken 1976). 3a summarizes acquisition of final nasals; 3b summarizes acquisition of fricatives.

Not all children show such an orderly progression as J in the relaxation of limitations on complexity, but presumably every child, as a part of the acquisition of his vocabulary and the construction of his phonological system, struggles through these processing problems with structural complexity and phonetic diversity. The notion of 'permitted complexity' is equally valid for adult users of language, as appears from the universal existence of phonotactic constraints, the language-specific phonotactic patterns shared by users of particular language varieties, and individual profiles of difficulty in processing phonological complexity. Its significance at the early stages in phonological development lies in the fact that the child's struggle with complexity is one of the principal means by which he achieves phonological segmentation and the identification of allophonic and morphophonemic relationships in the ambient language. Early phonological development includes (along with the mastery of particular articulations and the testing of rule-hypothesis) development of the ability to cope with increasing phonological complexity. This may be summarized as a seventh characteristic:

(7) The child gradually relaxes his constraints of selection and production to allow greater structural complexity and phonetic diversity within words. Further analyses of individual children's early phonological development should be instructive on the role of words, syllables, and other prosodic domains of phonotactic constraints in the development process and in phonology in general.

Individual Strategies

Linguists have traditionally been interested in characterizing human language in general, particular human languages, and dialect variation within a language, but not individual differences in language. Similarly, linguists studying child language development have generally been more interested in finding a universal order of acquisition or universal processes operating in acquisition than in examining the different routes children follow in acquiring language. It has long been my conviction, however, that the study of individual linguistic 'profiles' is of value for general linguistic theory as showing the nature and extent of variability within overall universal constraints, and that it is of immediate value for 'applications of linguistics' i.e. the use of linguistic findings by linguists or others interested in dealing with individual pathologies or social problems involving language (Ferguson 1975a, p.68). This view is becoming more acceptable in psycholinguistic research on child language: a quotation from a recent paper by Nelson expresses it well:

> It is becoming clearer ... that there is a wide variety of strategies or styles with which children approach the language learning task ... Even if there is only one language to be learned, there is more than one way to learn it. At the least, this should cause us to ask, "What are the possible ways of learning language?" in order both to build better theories and to understand better the developing child (Nelson 1975, p.138).

Individual differences in phonological development have been discussed

from a linguistic point of view for 'deviant' phonologies in a series of publications beginning with Haas 1963. This literature is reviewed, synthesized, and extended by Ingram in his new book (Ingram 1976) and represents an important advance in the understanding of phonological deviance and therapy. Most of this work deals with older, deviant children, however, and apart from comments in diary studies, discussions of individual strategies in normal phonological development are few e.g. Ferguson et al. 1973, pp. 61-62; Ferguson & Farwell 1975, pp. 435-437; Farwell 1976. Here a few examples of well-documented individual strategies can be given as an indication of the possibilities.

(a) Favorite sounds or variations. It frequently happens that a child treats one sound type or set of related sound types as 'favorite'. He chooses adult models containing it, he produces words with it more often than other words, he 'plays' with the sound. T. reported in Farwell 1976, chose s ʃ ʧ ʤ as favorite sounds almost from the beginning of language production, welcoming words like ice, eyes, shoes, keys, cheese and juice into her vocabulary, and pronouncing them very variably; the sounds themselves seemed more important to her (or more fun) than using them to make lexical contrasts. It may also happen that a child treats one sound or set of sounds as something to be avoided. Another child reported in Farwell 1976 avoided almost all adult words containing fricatives for several months.

(b) Reduplications. Although all children show some tendency to reduplication, individual children vary greatly in the extent to which they use it. Leslie (Ferguson et al. 1973) used reduplication for all her early words and persisted in reduplication as a major strategy for months, while Daniel (Menn 1971) preferred to reduce everything to monosyllables. The reduplication strategist prefers to choose adult models closer to reduplication and will even reduplicate monosyllabic models; the monosyllabist prefers monosyllabic models and reduces polysyllabic ones.

(c) Unique reduction devices. At the end of the '50 word' period or in the following period some children adopt a special strategy for coping with words of greater complexity than their production system can handle. They construct a unique reduction device (URD) which allows parts of different adult models to be produced the same way (cf. Menn 1971, pp. 241-242; Smith 1973, p. 172). The URD typically persists for several months until the child finally 'gives in' and starts acquiring the correct adult forms. A very striking example is one child's URD which made adult disyllables into CVjVC (Priestly 1975).

(d) Phonological differentiation vs. lexical expansion. As an example of a broad 'style' of phonological development, as opposed to specific strategies, some children prefer to build their phonological system slowly and carefully and limit their active lexicon to words they can say pretty accurately; others prefer to build vocabulary more rapidly, pronouncing many of the words inaccurately and without much evident phonological organization. In the former category are, for example, Hildegard, Macken's J and Vihman's daughter, while Hildegard's sister Carla and Macken's Si have the other learning style.

Up to the present time there has been no attempt to examine the range of individual variation in phonological development or to classify main types, but research of this kind is necessary if any useful sort of early assessment is to be developed. In the present state of knowledge clinical experience and personal hunches are the only basis for assessment at the early stages. On the basis of a handful of cases, Ferguson et al. (1973) hazarded the guess that a child who uses reduplication as his principal strategy, other things being equal (e.g. the amount of reduplication in the input), will be slower in phonological development than one who does not. Such hunches are nearly useless in the absence of confirmatory data, but there is a good chance that assessments of that kind, based on sufficient research, could be of diagnostic value. In any case, the basic point of individual difference may be listed as another important characteristic:

(8) Each child follows his own distinctive route in phonological development. 'Universals' in order of acquisition and 'natural processes' in the child's rules are statistical outcomes of the interaction of various factors rather than the inevitable features of development.

This paper has dealt with only selected aspects of early phonological development. It has not dealt with such topics as intonation or semantic function which would be necessary for any comprehensive treatment of the subject, and it has deemphasized the 'naturalness' and 'universality' of specific facts of inventory and process. Also, it has neither accepted nor proposed any general theoretical framework. Its value is intended to lie in calling attention to aspects of early phonological development which are neglected or not accounted for in much of the current literature, and in providing an informative account of the general course of events. The account of development offered has been summarized in eight important characteristics, which may be collected in a summary paragraph:

The child plays a highly active, creative role in the acquisition process. The child's early vocables constitute a connecting link between babbling and adult-modeled speech; the child's phonological systems for perception and production are relatively independent. In the child's construction of a phonological system for production he begins with structural constraints in selecting adult model words and in producing his own words. (The baby talk lexicon of the child's speech community provides a reservoir of phonologically simplified models on which the child can draw for his early words.) The child invents and applies to his repertoire of phonetic word shapes a succession of phonological rules which regularize the pronunciation of phonetically similar words. The child gradually relaxes his constraints of selection and production to allow greater standard complexity and phonetic diversity within words. Each child follows his own distinctive route in phonological development.

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